

Northeastern Forest Experiment Station

Upper Darby, Pa.

QUARTERLY REPORT

FOREST INFLUENCES AND FLOOD CONTROL SURVEYS

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FLOOD CONTROL SURVEYS

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STATUS OF FLOOD CONTROL SURVEY REPORTS

Connecticut River.--In Secretary's Office.

Merrimack River.--Step 8 draft in printing room.

Salt River.--Step 8 draft in process.

Allegheny River.--First draft in process--delayed by necessity for concentration on NENYIAC.

Upper Susquehanna and Monongahela Rivers.--No further progress.

NE-NYIAC--Resources Survey.--Hydrologic evaluations nearly complete--
work progressing on damages and benefits--
no change in target date of February 1953.

The NE-NYIAC and AWR surveys are the first attempts to prepare an integrated, inter-agency, comprehensive plan for the development of the natural resources of a region. Because this procedure is so new there is little in the way of precedent to guide the work. In the course of the study in this region we have evolved certain ideas and principles which we feel are working out rather well. Some of them arise from conditions peculiar to this region and might not work

as well elsewhere. Others still await complete acceptance by the inter-agency group, but in every case we think we have a good chance of gaining such acceptance eventually.

1. In the planning stage no agency labels are attached to any project. Some of the projects obviously have agency connections--Agriculture for land treatment, Federal Power for power projects, etc., but the structural phases of the flood prevention program bear no labels, simply an indication that storage or local protection is needed at a certain point. The entire inter-agency structural plan for flood prevention will be evaluated as a unit.
2. No plan of land treatment for flood prevention has been identified as such. We are evaluating, hydrologically, the entire proposed land-treatment plan of the Agriculture Report Group. In their proposed plan each measure, either singly or in combination, is justified on the basis of on-site benefits from increased production or erosion control. Since their plan is also largely being prepared by and will have the approval of the local people, we are proceeding on the basis that these measures will be installed no matter whether their effect on flood control is large or small.
3. We are therefore in the position of being able to say that, assuming full installation of the land-treatment program, 10 or 20 or 50 years hence the hydrologic condition of the watershed will be changed and that the flood problems which will have to be solved by a structural program at that time will likewise be changed. The hydrologic evaluation of the land-treatment program measures the amount of this change and determines the problem that should be met by the structural program.

Putting ourselves in this position immediately brings extremely critical examination of our entire program, of the probability of its complete installation and of our methods of hydrologic evaluation. There has been considerable comment about the undesirability of building as precise and detailed a plan as the engineers think theirs is, on what they consider to be a very shaky foundation.

4. We have made no exaggerated claims for the accuracy of our evaluation. We have admitted its weaknesses, due both to insufficient information and the lack of basic research. However, we are contending that it has been prepared by experts in a highly specialized field, that it is based on the best available knowledge and that within the limits imposed upon us at the present it is the best that can be had. We are also contending that just as a military strategist bases very detailed plans on the estimates of his intelligence officers as to the situation that will exist at

the time the plan becomes operational, so must the planners here accept estimates of probable future conditions as a basis for their work.

5. Since the best we can do is to estimate the probable range of effect from the land-treatment program, and since that is subject to further modification by the percentage of probable compliance with the program, the end result of the inter-agency study will be a series of alternative structural programs in support of a land-treatment program. At one extreme is the minimum structural program which all agencies can agree will be necessary even with the land treatment fully effective--at the other the program required if the land treatment is not installed or is ineffective.

It seems to us that such a presentation is desirable for several reasons:

It shows the maximum and minimum flood prevention benefits that can be expected from a land-treatment program.

It indicates to any reviewer to what extent the people of a watershed might solve their problems through their own individual endeavors.

It puts the burden of decision between the alternative programs on the local people, where we believe it belongs.

This whole approach places the burden of proof of the success of land-treatment programs for flood prevention squarely on our shoulders. If we are to achieve the position of precedence to which land managers claim their programs are entitled, this is a responsibility we must accept.

FOREST INFLUENCES

DELAWARE BASIN RESEARCH CENTER

by the Delaware Basin Staff

General

As predicted in the previous quarterly report, rainfall during the past hydrologic year greatly exceeded last year's record high at the Dill-down Watershed. From October 1, 1951, to September 30, 1952, a total of 75.9 inches of precipitation fell over the watershed. This may be compared with 60 inches last year and with a normal rainfall for the locality of 45 to 50 inches.

Distribution of rainfall has been relatively even throughout the year. March and July had the greatest monthly total while February and June were the low months.

As may be expected, ground-water levels and stream flow remained high through the summer months. At the present time, ground water is about at the level usually found at the beginning of the growing season. Soil moisture remained relatively high during the growing season and thus most of the storms resulted in accretions to ground water.

The largest storm of the year--in fact, the largest storm since the beginning of measurement--occurred on July 8 to 10 and amounted to 9.32 inches. Time of duration was 40 hours and the highest hourly intensity was 1.43 inches. A record peak stream flow of 196 cubic feet per second was caused by this storm.

Vegetation Survey

This project is well under way and will be completed this fall unless bad weather or unforeseen obstacles intervene. Although no compilations or analyses have been made as yet, it is evident that little of the watershed is covered by pure scrub oak. Most of the area bears a mixture of other species in addition to the scrub oak; however, their frequency appears to be too light to form a closed canopy and in many cases the species are probably unmerchantable. Sprouts of American chestnut, gray birch, and sassafras fall into the latter category and, from place to place, are sometimes the major component of the cover. Sprouts of red oak, pitch pine, and red maple are more desirable but less frequent.

Scrub Oak Conversion

The first formal examinations of this year's studies have not been completed, but certain observations may be made at this time.

Seedlings planted in the poisoned spots had a much higher mortality

rate than their controls, showing a residual toxicity of 2, 4, 5-T in the soil for at least 7 days after poisoning. All individuals of the hardwood species, tulip poplar and black cherry, were lost in comparison to high survival rates of both species where planted in the untreated brush. Mortality of the pines, red, pitch, and jack, was not complete in the poisoned area but much higher than the control.

Survival of the hardwood species was high where planted elsewhere than in the poisoned spots. In view of the fact that the stock was small and not particularly sturdy, the survival is surprising.

Direct seeding of acorns, both with and without cartridges, was tried in the poisoned plots and their controls and also in the area treated with the rototiller in 1951. In the latter area, germination and survival were excellent, 83% in cartridges and 89% without cartridges. The survivors are in fine condition. On the other hand, acorns seeded in the brush failed almost completely--only a few individuals germinated and survived. A check into the cause of the failure showed that rodents had removed practically all of these acorns. The two areas were adjacent and we can only conjecture as to the reason for the difference in rodent activity. The rototiller may have so changed the site that it was no longer habitable to the rodents. Or the acorns may have germinated more quickly in the rototiller area where they received more light and had higher soil temperatures. We would be grateful for any other possible explanation for this difference.

Preliminary examination of the fire lines treated with various herbicides this spring indicate that no poison gave a complete kill, no matter how high the concentration of the poison. Considerable resprouting is in evidence at the present time, although an examination next year may show some subsequent killing. A second phase of this study was established in August, using the same preparations and with four additional plots on which Ammate was applied at the rates of 1, 2, 3, and 4 pounds per gallon.

Minebank Studies

The Delaware Basin and Anthracite Centers cooperated in a study of the use of soil conditioning chemicals on minebanks. Two chemicals were tested: Ultrawet and Krilium. The study consisted of two phases: one, to study the effect of the chemicals on the survival and growth of seeds and seedlings on minebanks; second, to determine whether or not the chemicals affect infiltration on minebanks. Data are not available yet on the survival and growth study. The results of the infiltration study are as follows:

Ultrawet.--Results are inconclusive, but indicate that Ultrawet does not increase infiltration rates on minebanks.

Krilium.--On field soils Krilium increases the sustained infiltra-

tion rate but not the initial rate measured during the first ten minutes. When the soil is thoroughly saturated, there is no difference in infiltration rates. The moisture content of Krillium-treated soils is less than that of nontreated soils. We do not know whether the smaller moisture content of Krillium-treated soils has any significance with regards to the germination of grass or tree seeds. The final comparison made is with regards to bulk densities; there appears to be no difference between the treated and nontreated soils. There seems to be a possibility that additional sampling would perhaps have shown a statistical difference in both the infiltration rates and in the bulk densities. The averages for all figures indicate that the initial infiltration rate on field soils and the sustained rate on saturated soils is higher for Krillium-treated soils; also, the average bulk density of Krillium-treated soils is smaller. However, the "within class" variation is large and resulted in a statistical verdict of "not significant."

Calibration of Fiberglas Units

A number of fiberglas units have been calibrated successively in soils of different texture (sand, loam, silt loam). The final calibration curves (for the loam) are not yet drawn, but the outstanding feature of the curves is the difference between units with a different series number. The curves of all units calibrated in a soil of a specified texture are similar in shape; but the curves may be grouped in accordance with their serial numbers. That is, all units of the 700 series are displaced vertically away from the 1400 series. This difference is probably due to the textural grade of the fiberglas cloth used in units of different series. In order to eliminate this vertical displacement, the specifications for the silica fibered cloth should be amended to include the number of fibers that are to be found per lineal inch of both warp and woof.

A natural question to ask is: "What advantage would accrue from a strict specification regarding the density of weave of the warp and woof?" There might possibly be an incalculable advantage. Present calibration curves reflect, in a way, the tension curve of the soil. If the density of weave of the fiberglas cloth were standardized, then possibly a standard conversion table could be prepared listing resistance on the soil moisture unit in terms of pF. In other words, fiberglas units could then be used to obtain tension curves!

Miscellaneous

Bethlahmy and Reigner attended the annual meeting of the Northeastern Forest Soils Group, held at Elkins, West Virginia, on September 3 and 4. Most of the group remained another day in nearby Parsons, West Virginia to attend a show-me trip over the Fernow Experimental Forest.

Bethlahmy attended the annual meeting of the Inter-State Commission

on the Delaware. The Commission consists of delegates from the four states bordering the Delaware River. The Commission prepared a plan for conserving the water of the Delaware and for apportioning it among the four states. Three states (New York, New Jersey, and Delaware) have approved the plan; Pennsylvania has not. Since the State of New York is desperate for more water, and apparently believes that Pennsylvania will not approve the Incodel plan, it has petitioned the U.S. Supreme Court for permission to develop an independent water project on the Delaware.